Division of Geological & Geophysical Surveys

RAW-DATA FILE 2009-1 v. 1.2

GEOCHEMICAL, MAJOR-OXIDE, MINOR-OXIDE, TRACE-ELEMENT AND CARBON DATA FROM ROCKS COLLECTED IN 2008 IN THE EASTERN BONNIFIELD MINING DISTRICT, FAIRBANKS AND HEALY QUADRANGLES, ALASKA

by

Larry K. Freeman, Melanie B. Werdon, David J. Szumigala,
Joseph E. Andrew, Rainer J. Newberry, and Jennifer E. Athey

$7.00

October 2009

THIS REPORT HAS NOT BEEN REVIEWED FOR
TECHNICAL CONTENT OR FOR CONFORMITY OF THE
EDITORIAL STANDARDS OF DGGS

Released by

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
Division of Geological & Geophysical Surveys
3354 College Road
Fairbanks, Alaska 99709-3707

CONTENTS

TABLES

Note: The analytical data tables associated with this report are available in digital format as comma-separated value (CSV) files. Additional details about the organization of information are noted the accompanying metadata file. All files can be downloaded from the DGGS website (doi: 10.14509/20041).

GEOCHEMICAL, MAJOR-OXIDE, MINOR-OXIDE, TRACE-ELEMENT AND CARBON DATA FROM ROCKS COLLECTED IN 2008 IN THE EASTERN BONNIFIELD MINING DISTRICT, FAIRBANKS AND HEALY QUADRANGLES, ALASKA

by

LARRY K. FREEMAN, MELANIE B. WERDON, DAVID J. SZUMIGALA, JOSEPH E. ANDREW,
RAINER J. NEWBERRY, AND JENNIFER E. ATHEY

INTRODUCTION

Mineral-resources personnel from the Alaska Division of Geological & Geophysical Surveys carried out a geological field survey, including mapping and sampling in the eastern part of the Bonnifield mining district in the Fairbanks A-1 and A-2, and the Healy D-1 and D-2 quadrangles, Alaska from June 16 to July 18, 2008. The fieldwork provides basic information critical to building an understanding of Alaska's geology and is part of an integrated program of airborne geophysical surveys followed by geological mapping. During 2008, 242 rock samples were collected for geochemical trace-element analysis, 109 rock samples were collected for whole rock (major- and minor-oxide and petrogenetically important trace elements) analyses, and 7 samples were collected for analysis of non-carbonate carbon content. Location coordinates were collected using hand-held GPS units (no differential correction was applied). Coordinates are presented in latitude and longitude (based on the NAD 27 Alaska datum) and in UTM coordinates (based on the Clark 1866 spheroid, NAD27 datum, UTM zone 6 projection). The analytical data tables associated with this report are available in digital format as comma-separated value (CSV) files. Additional details about the organization of information are noted the accompanying metadata file. All files can be downloaded from the DGGS website (doi: 10.14509/20041). Sample numbers, location data, descriptions, and analytical results for each sample are tabulated in Tables 1–4 and Table 7.

SAMPLE COLLECTION TECHNIQUES

Samples of visibly mineralized rock, or rocks exhibiting features associated with mineralization, were preferentially collected and analyzed for geochemical trace elements. Samples of visibly carbonaceous or graphite-bearing metamorphic rock were preferentially collected and analyzed for their non-carbonate carbon content. Rock samples collected for major-oxide, minor-oxide, and trace elements include samples representative of a typical lithology, igneous or possible meta-igneous samples in order to determine composition, and samples whose petrogenetically important trace-elements could indicate their original tectonic setting. These rocks were collected in a random distribution across the study area.

ANALYTICAL METHODS

Trace-element geochemical analyses (table 2) and whole rock analyses (table 4) on rock samples collected in 2008 were performed by ALS Chemex (ALS) and the University of Alaska Fairbanks Advanced Instrumentation Laboratory (UAF). Rock samples were crushed with a Terminator oscillating jaw crusher with chrome steel alloy plates so that at least 70 percent of the material passes through a -10 mesh (2 mm) screen. Representative aliquots of 250 grams each were taken using a stainless steel riffle splitter. These samples were then pulverized in a chrome steel ring mill so that 85 percent of the sample passed through a -200 mesh (75 micron) screen. Trace-element analyses, the whole rock major element analyses and the gold analyses were performed using representative splits of each 250 gram pulp. A second 250 gram pulp was prepared at ALS for analysis at UAF (discussed below).

Initially, all potentially mineralized samples were assayed for gold by inductive coupled plasma-atomic emission spectroscopy following a 30g fire assay fusion (FA-ICP), after four-acid, near-total digestion. Trace-element geochemical analyses were performed by inductive coupled plasma-atomic emission spectroscopy (ICP-AES) methods after four-acid, near-total digestion. This method of digestion is possibly incomplete for some elements and may result in lower analytical results for these elements. The elements that may be affected by incomplete digestion, analytical methods, and lower and upper reporting limits are tabulated in Table 5. Rock samples with trace metal values above the detection limit in the initial trace element geochemical analysis were reanalyzed for those metals by the following methods: Au, Fire assay with a gravimetric finish using a 30 gram sub-sample; Ba, using X-ray fluorescence after lithium meta-borate fusion; Sb, Atomic Absorption spectrometry after a hydrochloric acid - potassium perchlorate digestion; and Ag, As, Cu, Pb, and/or Zn by inductive coupled plasma-atomic emission spectroscopy (ICP-AES) methods after four-acid, near-total digestion. Detection limits for the second set of analyses are listed in Table 5.

For the whole rock analyses (table 4), major- and minor-element oxides were determined at ALS by X-ray fluorescence spectrometry following a lithium borate fusion (ALS code WEI-GRA06). Trace element values (Nb, Rb, Sr, Y, and Zr) were determined by X-ray fluorescence spectrometry on a pressed pellet at UAF. Analytical methods and detection limits are tabulated in Table 6.

Non-carbonate carbon analyses (table 7) were performed by ALS. Non-carbonate carbon content was determined using a LECO furnace after a dilute acid digestion. The lower detection limit for percent carbon is 0.01, and the upper detection limit is 50.00.

ERRATA

Errors were found in the original data tables that were released in November 2009. The data files have been updated. A complete list of errata and corrections can be found in the accompanying metadata file.

ACKNOWLEDGMENTS

This project is part of the Alaska Airborne Geophysical/Geological Mineral Inventory Program funded by the Alaska State Legislature and managed by the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys. Partial funding for the geologic mapping and geochemical analyses was also provided through the State of Alaska General Fund and the U.S. Geological Survey STATEMAP Program under award number 08HQAG0051.